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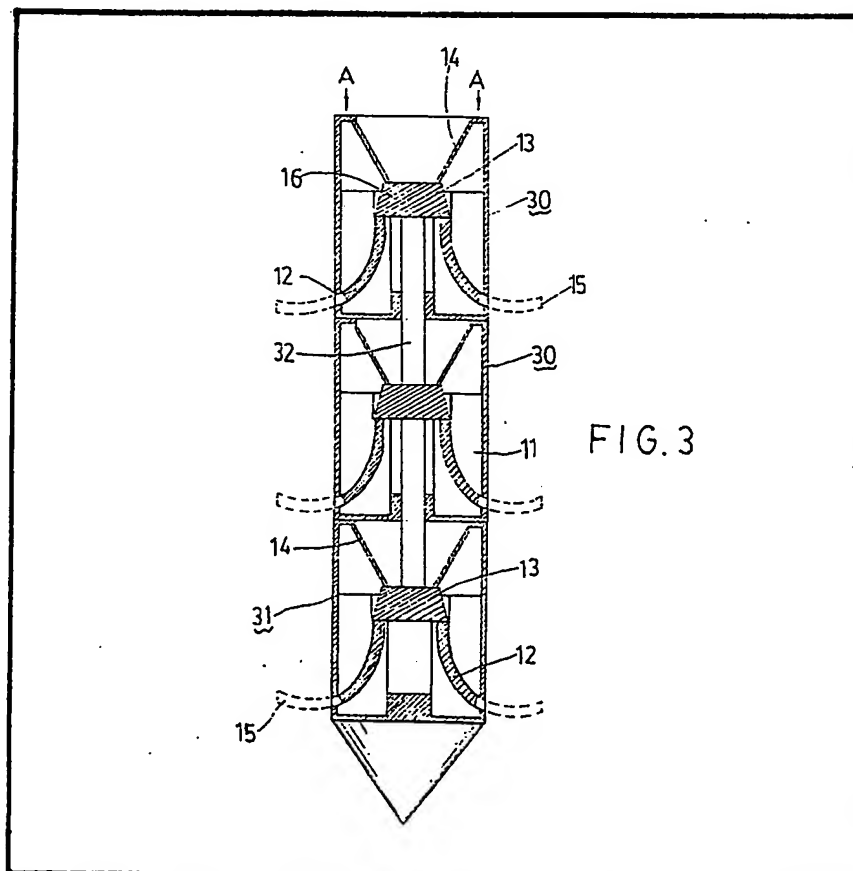
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(54) A foundation pile with multiple  
side-friction supports

(57) A foundation pile with multiple  
side-friction supports comprises: a pile  
body (10) having a conical pointed  
head at one end, an opening at the  
other, and a hollow section in the  
middle communicating with the  
opening; a guide member (14)  
disposed in the opening of the body  
(10); a plurality of fixed blocks (11)  
vertically formed in the hollow section  
along the inner wall of the body (10)  
and defining an arch-shaped space  
(16) between the fixed blocks (11)  
with an outlet (15) leading through

the body (10) at the lower end; a  
plurality of side-friction supports (12)  
separately received in the spaces (16)  
for being driven out of the body (10);  
and a punch pallet (13) having a  
plurality of protrusions formed along  
one side movably disposed in the  
hollow section with the upper side  
closing to the lower end of the guide  
member (14) and with the protrusions  
of the other side respectively resting  
on the top of the side-friction supports  
(12) for being punched down along  
the hollow section so as to drive all  
the side-friction supports (12) into the  
adjacent soil of the body (10) and  
increase the bearing force of the  
foundation pile.



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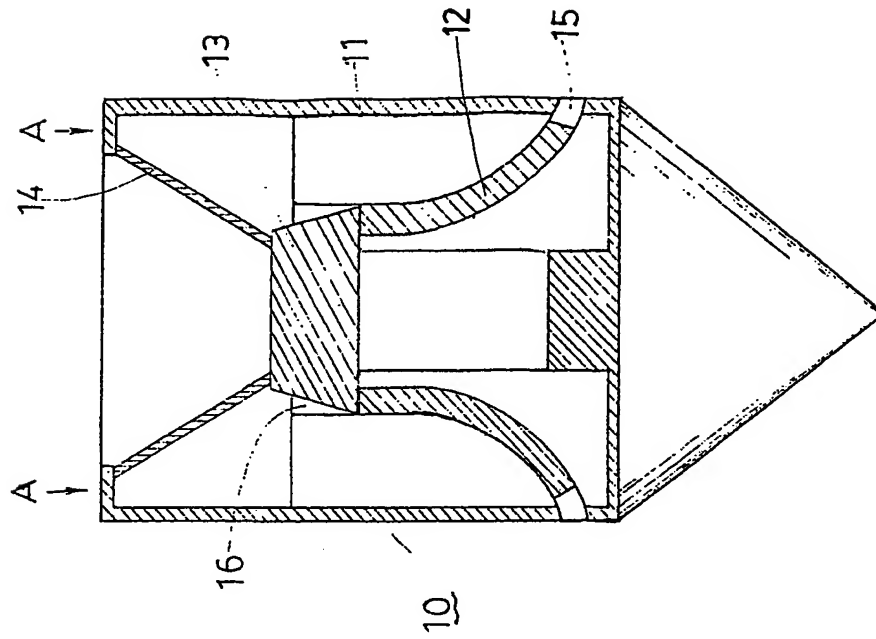


FIG. 2

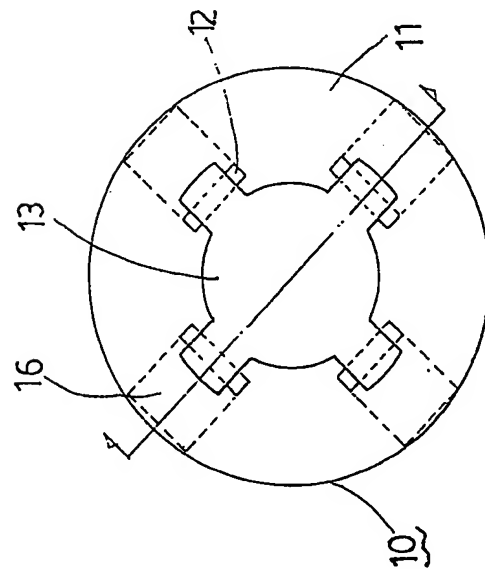


FIG. 1



## SPECIFICATION

**A foundation pile with multiple side-friction supports**

This invention is related to a foundation pile, and more particularly, dealt with multiple side-friction supports provided within the pile body for being driven into the soil with the body during piling operation so as to increase the bearing force of the foundation pile.

Conventionally, all the foundation piles are made in a single-body structure for being driven into the deep ground where the geological condition is mild so as to be served as a construction foundation. However, as the foundation pile is a single-body structure, density of piling has to be increased for securing a stable ground foundation for the construction. Otherwise, due to the mild geological state of the ground, displacement of the foundation pile therein will easily take place, resulting in serious condition affecting the safety state of the building thereof. Besides, to increase the depth and density of piling will also cost too much in material and labor work.

Accordingly, the primary object of this invention is to provide a foundation pile with multiple arch-shaped side-friction supports movably arranged in the pile body for being driven into the ground so as to overcome the above-mentioned problems.

This object is achieved by providing a foundation pile with multiple side-friction supports, which pile comprises: a pile body having a conical pointed portion at one end, an opening at the other, and a hollow section in the middle portion communicating with the opening; a hopper-shaped guide member disposed in the opening; a plurality of fixed blocks vertically formed in the hollow section along the inner wall of the pile body and defining an arch-shaped space between the fixed blocks with an outlet leading through the pile body at the lower end; a plurality of arch-shaped side-friction supports separately received in the spaces between the fixed blocks; and a punch pallet having a plurality of protrusions integrally formed along the lower edge and movably disposed in the hollow section by closing the upper side to the lower end of the hopper-shaped guide member and resting the protrusions respectively upon the top surface of the arch-shaped side-friction supports, so that, by striking down the punch pallet after the foundation pile has been driven into the ground, all side-friction supports will be driven into the adjacent soil of the pile body so as to increase the bearing force of the foundation pile.

Other objects and advantages of this invention will become more apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the present invention, in which:

Figure 1 is a top sectional view of a first preferred embodiment of a foundation pile with

multiple side-friction supports according to this invention;

Figure 2 is a side sectional view of a foundation pile with multiple side-friction supports according to this invention; and

Figure 3 is a second preferred embodiment of a multi-stage foundation pile with side-friction supports according to this invention.

Referring to Fig's 1 and 2, a first preferred embodiment of a foundation pile with multiple side-friction supports according to this invention comprises: a cylindrical pile body 10 having a conical pointed portion at the lower end, a longitudinal hollow section in the central portion and an opening in the upper part communicating with the hollow section; a hopper-shaped guide member 14 disposed in the upper opening of the pile body 10; a plurality of fixed blocks 11 vertically formed in the hollow section along the inner wall of the body 10 and defining an arch-shaped space 16 between the blocks 11 with an outlet 15 leading through the body 10 at the lower portion; a plurality of side-friction supports 12 in arch shape separately received in the spaces 16 for being driven out therefrom through the outlets 15; and a punch pallet 13 having a plurality of protrusions integrally formed along the lower edge movably disposed between the lower open end of the hopper-shaped guide member 14 and the upper portion of the hollow section with the protrusions respectively resting upon the top of all the side-friction supports 12 for being punched down along the hollow section together with the side-friction supports 12.

During piling, first, drive the foundation pile body 10 into the ground by punching it on the top area A (as shown in Fig. 2) until the body 10 has been driven into the soil at a proper place, and then, striking down the punch pallet 13 from the hopper-shaped guide member 14 so as to evenly drive the side-friction supports 12 into the adjacent soil of the body 10 through the outlet 15, the bearing force of the foundation pile will be greatly increased.

Referring to Fig. 3, a second preferred embodiment of a multistage foundation pile with side-friction supports according to this invention comprises in combination a plurality of cylindrical auxiliary pile bodies 30 each having a flat surface at the lower portion being axially and rigidly coupled with the top end of a cylindrical prime pile body 31, which is the last stage of the multi-stage foundation pile, and has a pointed end at the lower portion. The structure and elements of each auxiliary pile 30 and the prime pile 31 are the same as those provided in the first embodiment shown in Fig. 2 except that a plurality of linking rods 32 are axially connected between the first punch pallet 13 of the first auxiliary pile body 30 through the last punch pallet 13 of the prime pile body 31. The number of stages required in this embodiment is determined on the basis of the soil condition so as to increase the adhesive force of foundation pile in the ground. During piling, just perform the

same operations as described above for the first embodiment, and the bearing force of the foundation pile will be more effectively increased through the side-friction supports of all the stages thereof.

While preferred embodiments of this invention have been illustrated and described, it is to be understood that numerous changes and modifications may be made therein without departing from the spirit and scope of this invention as defined in the appended claims.

#### Claims

1. A foundation pile with multiple side-friction supports characterized by:
  - 15 a cylindrical pile body having a pointed end at the lower portion, a hollow section in the central portion, and an opening in the upper portion communicating with said hollow section;
  - 20 a guide means disposed in said opening; a plurality of fixed blocks vertically provided in said hollow section along the inner wall of said pile body and defining an arch-shaped space between said fixed blocks with an outlet at the lower portion leading through said pile body;
  - 25 a plurality of side-friction supports respectively fitted in said spaces defined by said fixed blocks; and
  - 30 a punch pallet movably installed between the lower end of said guide means and the upper end of said hollow section in conjunction with said side-friction supports, whereby, upon driving said pile body into the ground of construction, striking down said punch pallet along said hollow section through said guide means for evenly driving all said side-friction supports into the adjacent soil of said pile body, the bearing force of said
  - 40 foundation pile will be increased accordingly.
2. A foundation pile according to Claim 1 wherein said guide means is characterized by a hopper-shaped member disposed in the upper opening of said pile body with the larger open end facing upward and the narrow end leading toward said hollow section so as to facilitate punch operation therefrom.
3. A foundation pile according to Claim 1 wherein said punch pallet is characterized by
  - 50 having a plurality of protrusions integrally formed along one side edge for being respectively rested upon the top surface of said side-friction supports so that, by striking down said punch pallet on the upper side along said hollow section, all side-

55 friction supports will be evenly driven out into the soil therefrom.

4. A foundation pile with multiple side-friction supports characterized by:

- 60 a cylindrical prime pile body having a conical pointed end at the lower portion, a hollow section in the central and an opening in the upper portion communicating with said hollow section;
- 65 a plurality of auxiliary cylindrical pile bodies each having a flat surface at the lower end, a through hollow section in the middle, and an opening in the upper portion being longitudinally connected to the upper end of said primer pile body;
- 70 a plurality of fixed blocks vertically provided within the hollow section of said cylindrical prime pile body and each of said auxiliary pile bodies, and defining an arch-shaped space between said fixed blocks with outlet separately leading through each pile body at the lower portion;
- 75 a plurality of guide means respectively disposed in said opening of the upper portion of each pile body;
- 80 a plurality of side-friction supports respectively fitted in said spaces defined by said fixed blocks;
- 85 a plurality of punch pallets movably and respectively installed between the lower end of said guide means and the upper end of said hollow section of each pile body in conjunction with said side-friction supports; and
- 90 link means axially connected between said punch pallets, whereby, upon driving said pile bodies into the ground of construction, striking down said punch pallet through said guide means at the first auxiliary pile body for evenly driving all said side-friction supports into adjacent soil of said pile bodies, the bearing force of said foundation pile will be greatly increased thereat.
5. A foundation pile with multiple side-friction supports according to Claim 4, wherein said link means is characterized by having a plurality of linking rods respectively connected in axial line between the first one of said punch pallets in the first auxiliary pile body through the last punch pallet in the prime pile body.
- 100 6. A foundation pile with multiple side-friction supports substantially as hereinafter described with reference to the accompanying drawings.
- 105 7. A foundation pile substantially as herein described with reference to the accompanying
- 110 drawings.